

# WORKSHOP ON MEMBRANE SCIENCE USING X-RAY TECHNIQUES



## *Welcome and Opening Remarks*

*Jin Wang*  
*Argonne National Laboratory*

*Millie Firestone*  
*Argonne National Laboratory*

*Tom Irving*  
*Illinois Institute of Technology*

*Randy Winans*  
*Argonne National Laboratory*

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## *Workshop Scope*

- Interaction of x-rays with surfaces and interfaces
- Areas of Membrane Science with Potential for X-rays Techniques:
  - Bio-Membranes
  - Organic-Membranes
  - Inorganic-Membranes and
  - Membrane Interfaces



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## *APS Membrane Science Capabilities*

• Bio-CAT	-	Sector 18
• CARS-CAT	-	Sector 15
• CMC-CAT	-	Sector 9
• DND-CAT	-	Sector 5
• IMMW-CAT	-	Sector 8
• MR- CAT	-	Sector 10
• UNI-CAT	-	Sector 33
• XOR/BESSRC	-	Sector 12
• XOR	-	Sector 1



# **Grand Challenges In Membrane Science and Opportunities for X-ray Techniques to Address them**



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## Science Challenges

Bio-membranes:

Organic-membranes:

Inorganic-membranes:

Interfaces:



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## Practical Challenges

1. Surface sensitive techniques:

Reflectivity

SAX

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1. Development and Integration of Analysis Software with the Experiment
2. Dedicated Instruments for Surface Scattering
3. Medeling of surfaces and interfaces



## *Draft Workshop Objectives*

- 1. Explore the breadth of science covered by the workshop topics, *not* limiting to synchrotron techniques alone.**
- 2. Identify opportunities for continued scientific discovery and impact using the Advanced Photon Source during the next 5-10 years in the inter-disciplinary areas of membrane science.**
- 3. Identify new scientific proposals/programs specific to the emerging areas of Membrane Science that the participants will bring to the APS during next 5 to 10 years. Also evaluate the capital and operational requirements for these proposals/programs.**
- 4. In addition to available beamline capabilities at the APS, identify future needs to support research in this area of science and technology.**
- 5. Address the need and support for theoretical work to strengthen the experimental research.**
- 6. Prepare a summary document for the archival literature to serve as a roadmap for the membrane research using x-rays at the Advanced Photon Source and suggest the role of the Advanced Photon Source towards this objective.**

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## Charge to the Participants

1. Identify Grand Challenge Science and Technological Problems in the Field of Membrane Science to be Addressed During the Next 5-10 Years Using APS
2. Identify and Justify the Technical Requirements to Meet the Grand Challenge Problems:
  - New instrumentation and techniques that need be developed on existing beamlines to perform new kind of science.
  - Need for new dedicated beamline for this community
3. Identify R&D Areas that will Prepare the Community to Address Grand Challenge Problems



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## *Workshop Report*

- The summaries and slides provided by the speakers of the talks can be accessed directly by clicking the 'summary' or 'slides' in the 'program' on the workshop web.
- You can continually input your thoughts using the 'Swiki' software linked to the lap-top using Wi-Fi Input can be made even after the workshop.
- Address the applicable objectives in each of the topics in the scope of the workshop and make recommendations to the APS

